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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/765,920

01/29/2004

Minoru Yoshida

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EXAMINER

ZETTL, MARY E

ART UNIT

PAPER NUMBER

2878

DATE MAILED: 10/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/765,920

Applicant(s)

YOSHIDA ET AL.

Examiner

Mary Zettl

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

The IDS supplied by the candidate was not in the proper form. The references should be filed properly and resubmitted.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 10, 15-17, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Shishido et al. (US 6,800,859 B1).

Regarding claims 1, 2, 15, 16, and 20, Shishido et al. teaches a pattern defect inspection apparatus comprising: a recipe setting unit for setting an inspection recipe and/or a review recipe (CPU and storage device, Figure 1; items 13 and 14; col. 8, lines

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20-32); a quantity-of-light calculating unit (computer; Figure 23, item 705; col. 16, line 5) for calculating a quantity of ultraviolet laser light in accordance with the inspection recipe and/or the review recipe that have been set by the recipe setting unit; an illumination optical system including: a laser light source for emitting ultraviolet laser light (Figure 1, item 3; col. 7, line 41); a quantity-of-light adjusting unit (A/O modulator; Figure 22, item 706; col. 16, lines 9-15) for adjusting a quantity of the ultraviolet laser light emitted from the laser light source in accordance with the inspection recipe and/or the review recipe set by the recipe setting unit; an illumination range forming unit for forming on a sample an illumination range of the ultraviolet laser light whose quantity has been adjusted by the quantity-of-light adjusting unit (Abstract, lines 9-12); a coherence reducing system (Figures 11-15; col. 11, lines 34-67) for reducing coherence of the ultraviolet laser light received within the illumination range that has been formed by the illumination range forming unit; and an irradiation optical system for irradiating the sample with a ultraviolet light flux whose coherence has been reduced by the coherence reducing system (col. 5, line 34); and a detection optical system including: a condensing optical system (beamsplitter; Figure 1, item 5; col. 7, line 44-46) for condensing light reflected from the sample; a diffracted-light control optical system (quarter wavelength plate; Figure 1, item 6; col. 7, line 48) for controlling diffracted light of the reflected light that has been condensed by the condensing optical system; and a detecting unit (CCD image sensor; col. 10, lines 4-6) for imaging a reflected light image coming from the sample to detect an image signal, said reflected light image being obtained through the diffracted-light control optical system.

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Regarding claims 3 and 17, Shishido et al. discloses the limitations set forth in claim 1, and further discloses an image processing unit for detecting a defect of a pattern formed on the sample on the basis of the detection image signal detected by a detector provided in the detecting unit (Figure 29, item 915; col. 18, line 17).

Regarding claim 10, Shishido et al. disclose the limitations set forth in claim 1, and further disclose the first detector comprising an accumulated type image sensor (CCD image sensor; Figure 7, item 71; col. 10, lines 29-34).

3. Claims 14 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Maeda et al. (US 6,621,571 B1).

Regarding claims 14 and 21, Maeda discloses in claim 14 (column 25, lines 33-53) an apparatus for inspecting a defect, comprising: a laser light source which emits a laser; a coherency reducer which reduces coherency of said laser emitted by said laser light source means; an illuminator which illuminates a specimen with said laser of which a coherency thereof is reduced by said coherency reducer; an analyzer which adjusts polarization states of light diffracted from the specimen illuminated by the illuminator; an image detector which detects an image of said specimen formed by diffracted light from said specimen and passed through said analyzer; and an image processor which processes an image of said specimen detected by said image detector. In addition, Maeda discloses the inspection apparatus handling a wafer having a diameter of 300 mm at a speed equivalent to a throughput of three pieces of wafers or more per hour,

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and detects a defect having a size of 100 nm included in a pattern formed on the sample (col. 23, lines 33-43).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 4-9 and claim 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shishido et al. (US 6,800,859 B1) in view of Worster et al. (US 5,479,252 A).

Regarding claims 4 and 18, Shishido et al. teach all of the limitations set forth in claims 1 and 15. Shishido does not disclose expressly the inspection recipe and/or the review recipe set up on a recipe-setting screen. Worster et al. teaches a computer display (Figure 2, item 215 and Figure 4) for displaying menu selections for control of the laser imaging system. It would be obvious to one skilled in the art to take the invention of Shishido et al. and modify it such that a recipe-setting screen was incorporated in order to increase the amount of information that can be viewed simultaneously.

Regarding claims 5, 6, and 19, Shishido et al. teach all of the limitations set forth in claims 1 and 15. Shishido et al. do not disclose expressly the means for the laser light source to be switched between a state close to ON and a state close to OFF. The use of a shutter for controlling the quantity-of-light is common in the field of defect inspection. Worster et al. teach a laser imaging system, including software for setting up predetermined recipes for screen configuration, laser scan parameters, and defect codes (col. 12, lines 62-67), laser light source (Figure 2, item 201; col. 6, line 62), an illumination range forming unit (col. 6, lines 21-22); diffracted light control optical system (spatial filter; Figure 2, item 204 and plurality of objective lens; Figure 2, item 205); and a detecting unit (Figure 2, item 212; col. 10, lines 46-44). In addition, Worster et al. teach a shutter (col. 12, line 44) for the laser which provides a means for switching the ultraviolet laser light source between a state close to ON and a state close OFF, which can be arbitrarily controlled through the display of LON (local operating network) nodes. It would be obvious to one skilled in the art to take the invention of Shishido et al. and

modify it such that the shutter suggested by Worster et al. was provided such that a means for switching the laser light source between a state close to ON and a state close to OFF was provided in order to reduce power consumption.

Regarding claim 7, Shishido et al. teach the limitations set forth in claim 1. Shishido et al. do not disclose expressly a filter. Worster et al. teach a filter (figure 2, item 202) capable of changing the quantity of transmitted light (col. 6, lines 48-55). At the time the invention was made, it would be obvious to one of ordinary skill in the art to take the invention of Shishido et al. and modify it such that a filter was utilized to change the quantity of transmitted light. A filter allows the light to be limited such that only the amount of light required for inspection is provided.

Regarding claim 8, Shishido et al. in view of Worster et al. teach the limitations set forth in claim 7. Worster et al. does not disclose expressly a filter devised not to return light reflected from an incident plane to the laser light source. However, Worster et al. teaches a filter (Figure 2, item 202). It is well known to one skilled in the art that a filter allows only light of a certain wavelength to pass through and that after striking an object the wavelength of the light reflected would be different such that the filter would prevent this different light from passing through to the laser light source thus reducing possible sources of error.

Regarding claim 9, Shishido et al. teach the limitations set forth in claim 1. Shishido does not disclose expressly a first detector for detecting an image signal for inspection and a second image signal for viewing. Worster et al. teach a first detector (microscope illuminator; Figure 2, item 220) for detecting an image signal for inspection

and a second detector (video camera; Figure 2, item 219) for detecting an image for viewing, each of said first detector and second detector being imaged a reflected light image obtained from the sample through the diffracted-light control system (beam splitters; Figure 2, items 221 and 209). Worster et al. does not teach switching a switching optical system between the time of inspection and the time of viewing however, in the setup of Worster et al. this extra component is not needed because of the particular setup that is employed. At the time the invention was made it would be obvious to one skilled in the art to take the invention of Shishido et al. and modify it such that a first detector and a second detector as suggested by Worster et al. is utilized since certain setups are better suited for inspecting and others are better suited for viewing.

5. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shishido et al. (US 6,800,859 B1) in view of Maeda et al. (US6,621,571 B1).

Regarding claim 11, Shishido et al. disclose the limitations set forth in claim 3, and further disclose a storage unit for storing a digital reference image signal (Figure, 1 items 11 and 14) and a defect detecting unit for detecting a defect of a pattern formed on the sample by comparing the digital detection image signal corrected by the brightness correcting unit with the digital reference image signal (col. 8, lines 14-32). Shishido et al. do not disclose expressly a brightness correcting unit. Maeda et al. teach a brightness correcting unit for correcting brightness of at least one of the digital image signals so that brightness in a normal portion of the digital detection image

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signal, which has been detected by the first detector and then converted into the digital signal, becomes substantially the same as brightness of a normal portion of the digital reference image signal stored in the storage unit (col. 15, lines 18-25). At the time the invention was made it would be obvious to one of ordinary skill in the art to modify the invention of Shishido et al. such that the means for brightness correction as described by Maeda et al. was added so that two images having different brightness can be compared.

Regarding claim 12, Shishido et al. teach the limitations set forth in claim 3. Shishido further teaches a storage unit (Figure 1 items 11 and 14) for storing a digital reference image signal; a local gray-scale converter (Figure 1, item 10; col. 7, line 65) for correcting a local gray scale value of at least one of the digital image signals; and a defect detecting unit for detecting a defect of a pattern formed on the sample by comparing the digital detection image signal corrected by the local gray-scale converter with the digital reference image signal (col. 8, lines 14-32). Shishido does not disclose expressly, a scatter-diagram creation unit. Maeda et al. disclose a scatter-diagram creation unit (Figure 29, item 293; col. 18, line 20) for creating a scatter diagram illustrating an association between a feature index in a normal portion of the digital detection image signal and a feature index in a normal portion of the digital reference image signal stored in the storage unit, said digital detection image signal being detected by the first detector and then being converted into a digital signal. At the time the invention was made, it would be obvious to one skilled in the art to take the

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invention of Shishido et al. and modify it such that a scatter diagram was created in order to provide a visual aid and information for detecting defects.

Regarding claim 13, Shishido et al. teach the limitations set forth in claim 1. Shishido et al. do not disclose expressly a polarization element group. Maeda et al. disclose a polarization element group (Figure 25, item 241; col. 13, lines 10-13). It would be obvious to one skilled in the art to take the invention of Shishido et al. and modify it such that a polarization element group was added so that partial polarized components in the detected light can be detected and so that the performance of the optical system is enhanced.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Zettl whose telephone number is (571) 272-6007. The examiner can normally be reached on M-F 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MZ



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